



## **Impact of present-day and future (1850-2200) ice sheet melting on regional climate in the fully coupled CESM**

Jan Lenaerts (1), Leo van Kampenhout (1), Miren Vizcaino (2), Dewi Le Bars (1), and Michiel van den Broeke (1)

(1) Institute for Marine and Atmospheric research Utrecht, Utrecht University, The Netherlands (j.lenaerts@uu.nl), (2)

Department of Geoscience and Remote Sensing, Delft University of Technology, The Netherlands

Earth's ice sheets are currently losing volume at an accelerating pace, thereby not only contributing to sea level rise, but also altering the global ocean freshwater budget. The latter potentially impacts ocean circulations, which in turn affects polar and global climate. However, state-of-the-art climate models (e.g. from CMIP5) do not include changing meltwater fluxes from ice sheets, since both ice dynamics and snow hydrology are poorly represented. Here we forced the fully coupled,  $\sim 1^\circ$  resolution Community Earth System Model (CESM) with a best estimate of past (from 1850 onwards), present and future ice sheet freshwater forcing according to two climate change scenarios, RCP2.6 and RCP8.5, both until the year 2200. This dataset was constructed from observations and regional climate model output and contains high spatial (drainage basin) and temporal (daily) detail. We compare results of these CESM simulations to observations and benchmark CESM simulations, without ice sheet melting, and focus particularly on the North Atlantic region. We find that ice sheet melting leads to additional weakening in the meridional overturning circulation strength in the North Atlantic beyond the year 2100, with important consequences for the climate in northwestern Europe and Greenland itself.